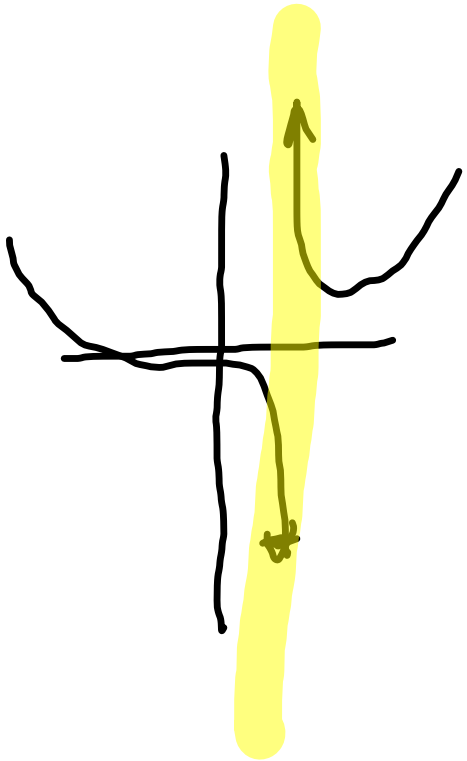
2.1 b more on limits

non existant limits

1. asymptote

$$\lim_{x \to 2} \frac{x^3 - 1}{x - 2}$$



$\lim_{x \to 2^+} f(x) = \infty$ dne

$\lim_{x \to 2^-} f(x) = -\infty$ dne

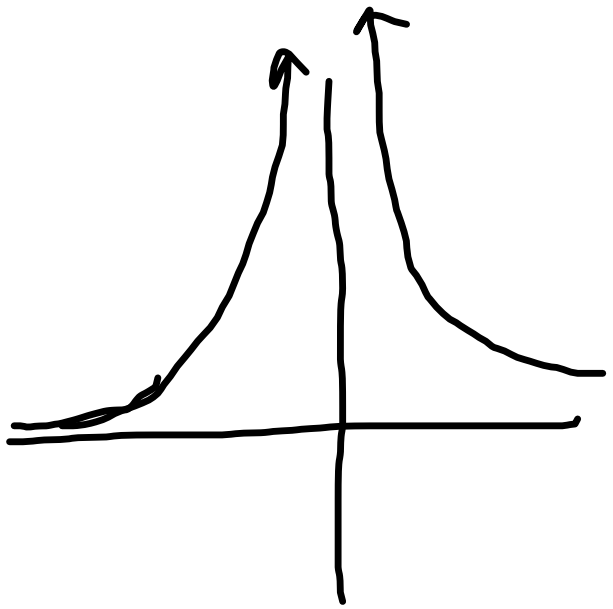
$\lim_{x \to 2} f(x)$ dne

do graphically

$$\lim_{x \to 0^+} \frac{1}{x^2} = \infty$$

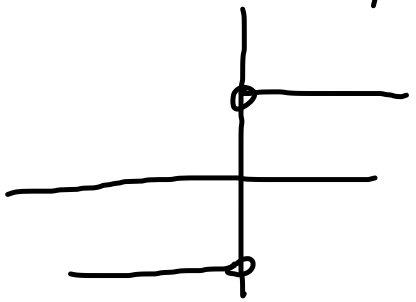
$$\lim_{x \to 0^-} \frac{1}{x^2} = \infty$$

$$\lim_{x \to 0} \frac{1}{x^2} \text{ dne}$$



$y = \frac{|x|}{x}$

do graphically



$\lim_{x \to 0^+} y = 1$

$\lim_{x \to 0^-} y = -1$

$\lim_{x \to 0} y = \text{dne}$

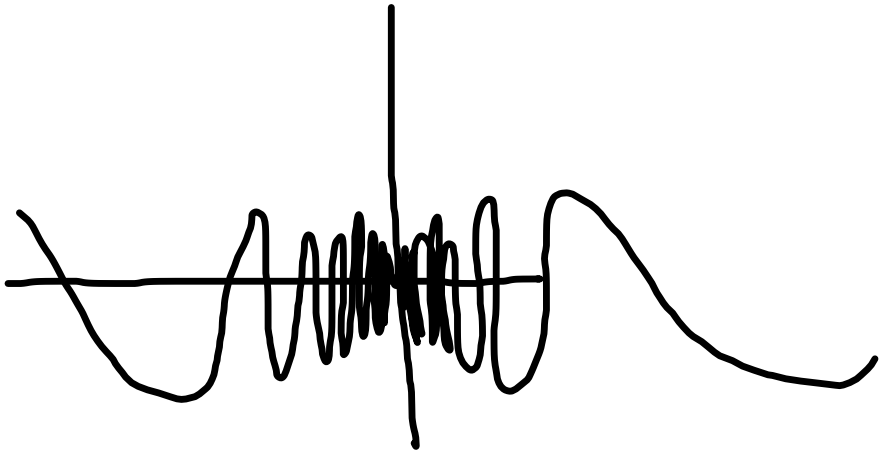
justify. explain

because left & right hand limits are different

do graphically

$$\lim_{x \to 0} \sin\left(\frac{1}{x}\right) = ?$$

dne because of oscillation



diverges by oscillation

$$\lim_{x \to 0} x^2 \sin\left(\frac{1}{x}\right) = 0$$

by sandwich theorem

$$-x^2 \leq x^2 \sin\left(\frac{1}{x}\right) \leq x^2$$

mult by x^2

$$-1 \leq \sin\frac{1}{x^2} \leq 1$$

How close should x be to 4

so that $1.8 \leq y \leq 2.2$?

solve graphically

ans:

$3.24 \leq x \leq 4.84$